AMENDMENTS TO CLAIMS

• Please amend pending claims 1, 2, 7, 9, 10, 11, 17, 23, 25, 29, 30, and 32, as indicated below. A complete listing of all claims and their status in the application are as follows:

1. (currently amended): A method for manufacturing a heterojunction bipolar transistor comprising:

providing a substrate;

forming an intrinsic collector structure on the substrate;

forming an extrinsic base ~~structure~~ stack partially overlapping the intrinsic collector structure;

forming a recess under the extrinsic base stack adjacent one side of the intrinsic collector structure;

forming an intrinsic base structure adjacent the intrinsic collector structure and under the extrinsic base ~~structure~~ stack in the recess;

forming an emitter structure adjacent the intrinsic base structure;

forming an extrinsic collector structure adjacent the intrinsic collector structure apart from the intrinsic base structure;

forming an interlevel dielectric layer; and

forming a plurality of contacts through the interlevel dielectric layer to the extrinsic collector structure, the extrinsic base structure, and the emitter structure.

2. (currently amended): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic base structure selectively grows a compound semiconductive material adjacent the intrinsic collector structure in the recess.

3. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein:

forming an extrinsic base structure surrounds the emitter structure with the extrinsic base structure; and

forming the collector structure surrounds the extrinsic base structure with the collector structure.

4. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the emitter structure, the extrinsic base structure, and the collector structure forms at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

5. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein;

forming the emitter structure forms an emitter structure substantially covering and parallel to the intrinsic base structure; and

forming the collector structure forms a collector structure that is substantially perpendicular to the emitter structure.

6. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic base structure forms a structure comprising at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

7. (currently amended): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the extrinsic base ~~structure~~ stack over the intrinsic collector structure further comprises:

forming ~~a base stack comprising the extrinsic base structure and~~ an emitter structure in the extrinsic base stack.

8. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 1 wherein forming the intrinsic collector structure comprises:

forming a first trench in the substrate; and

forming a second trench in the substrate spaced from the first trench to form the intrinsic collector structure between the first trench and the second trench.

9. (currently amended): A method of manufacturing a heterojunction bipolar transistor comprising:

providing a substrate;

forming a collector structure on the substrate;

forming a base stack comprising an extrinsic base structure and an extrinsic emitter structure over the collector structure;

forming a recess into the collector structure adjacent the base stack;

forming an intrinsic base structure in contact with the extrinsic base structure and adjacent the collector structure in the recess;

forming an intrinsic emitter structure in contact with the extrinsic emitter structure and adjacent the intrinsic base structure;

forming an interlevel dielectric layer; and

forming a plurality of contacts through the interlevel dielectric layer in contact with the collector structure, the extrinsic base structure, and the extrinsic emitter structure.

10. (currently amended): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the base stack comprises:

forming a first insulating layer over the collector structure;

forming an extrinsic base ~~structure; and~~ structure over the first insulating layer;

forming a second insulating layer over the extrinsic base structure;

forming an extrinsic emitter ~~structure.~~structure over the second insulating layer; and

forming a third insulating layer over the extrinsic emitter structure.

11. (currently amended): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein:

forming an extrinsic base structure surrounds the emitter structure with the extrinsic base structure; and

forming the collector structure surrounds the extrinsic base structure with the collector structure.

12. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the emitter structure, the extrinsic base structure, and the collector structure forms at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

13. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein;

forming the emitter structure forms an emitter structure substantially covering and parallel to the intrinsic base structure; and

forming the collector structure forms a collector structure that is substantially perpendicular to the emitter structure.

14. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the intrinsic base structure comprises:

forming a recess beneath the base stack; and

growing a compound semiconductive material in the recess.

15. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein forming the intrinsic base structure forms a structure of at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

16. (original): The method of manufacturing a heterojunction bipolar transistor as claimed in claim 9 wherein;

forming the base stack forms an extrinsic base structure in contact with the intrinsic base structure;

forming the extrinsic collector structure forms a semiconductive material adjacent the intrinsic collector structure; and

forming the intrinsic emitter structure forms a semiconductive material adjacent the intrinsic base structure.

17. (currently amended): A heterojunction bipolar transistor comprising:

a substrate;

an intrinsic collector structure having a recess on the substrate;

an extrinsic base ~~structure~~ stack partially overlapping the recess in the intrinsic collector structure;

an intrinsic base structure in the recess adjacent the intrinsic collector structure and under the extrinsic base structure;

an emitter structure adjacent the intrinsic base structure;

an extrinsic collector structure adjacent the intrinsic collector structure;

an interlevel dielectric layer; and

a plurality of contacts through the interlevel dielectric layer to the extrinsic collector structure, the extrinsic base structure, and the emitter structure.

18. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic base structure is a structure comprising at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

19. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein:

the emitter structure is surrounded by the extrinsic base structure; and

the collector structure surrounds the extrinsic base structure.

20. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein the emitter structure, the extrinsic base structure, and the collector structure form at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

21. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein;

the emitter structure substantially covers and is parallel to the intrinsic base structure; and

the collector structure is substantially perpendicular to the emitter structure.

22. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic base structure is adjacent the intrinsic collector structure.

23. (currently amended): The heterojunction bipolar transistor as claimed in claim 17 wherein the extrinsic base structure is in a base stack <u>further</u> comprising:

an extrinsic emitter structure.

24. (original): The heterojunction bipolar transistor as claimed in claim 17 wherein the intrinsic collector structure comprises:

a first trench in the substrate; and

a second trench in the substrate spaced from the first trench to form the intrinsic collector structure between the first trench and the second trench.

25. (currently amended): A heterojunction bipolar transistor comprising:

a substrate;

a collector structure having a recess on the substrate;

a base stack comprising an extrinsic base structure and an extrinsic emitter structure over the collector structure in the recess;

an intrinsic base structure adjacent the collector structure;

an intrinsic emitter structure adjacent the intrinsic base structure;

an interlevel dielectric layer; and

a plurality of contacts through the interlevel dielectric layer in contact with the collector structure, the extrinsic base structure, and the extrinsic emitter structure.

26. (original): The herterojunction bipolar transistor as claimed in claim 25 wherein:

the emitter structure is surrounded by the extrinsic base structure; and

the collector structure surrounds the extrinsic base structure.

27. (original): The heterojunction bipolar transistor as claimed in claim 25 wherein the emitter structure, the extrinsic base structure, and the collector structure form at least one of substantially concentric circles, substantially concentric ovals, substantially concentric rectangles, substantially concentric squares, and combinations thereof.

28. (original): The heterojunction bipolar transistor as claimed in claim 25 wherein;

the emitter structure substantially covers and is parallel to the intrinsic base structure; and

the collector structure is substantially perpendicular to the emitter structure.

29. (currently amended) The heterojunction bipolar transistor as claimed in claim 25 wherein the base stack comprises:

a first insulating layer;

an extrinsic base ~~structure; and~~ structure on the first insulating layer;

a second insulating layer over the extrinsic base structure;

an extrinsic emitter ~~structure.~~ structure over the second insulating layer; and

a third insulating layer over the extrinsic emitter structure.

30. (currently amended): The heterojunction bipolar transistor as claimed in claim 25 wherein;

~~the base stack has a recess; and~~

the intrinsic base structure comprises a compound semiconductive material in the recess.

31. (original): The heterojunction bipolar transistor as claimed in claim 25 wherein the intrinsic base structure comprises a structure of at least one of silicon-germanium, silicon-germanium-carbon, and a combination thereof.

32. (currently amended): ~~A~~ The heterojunction bipolar transistor as claimed in claim 25 wherein;

the base stack comprises an extrinsic base structure in contact with the intrinsic base structure;

the extrinsic collector structure comprises a semiconductive material adjacent the intrinsic collector structure; and

the intrinsic emitter structure comprises a semiconductive material adjacent the intrinsic emitter structure.